

killed, rather than starting the data-processing operation all over from the beginning. This can help to mitigate the impact of the software application being killed, as a result of the software application's resource usage exceeding the predefined resource-usage limit. As another example, the lookup table can specify that for a given event notification the software application is to be migrated to one or more different nodes having a higher resource-consumption limit than the node(s) on which the software application is currently executing. As still another example, the lookup table can specify that for a given event notification the software application is to kill one or more of its internal processes to reduce its resource usage.

[0013] These illustrative examples are given to introduce the reader to the general subject matter discussed here and are not intended to limit the scope of the disclosed concepts. The following sections describe various additional features and examples with reference to the drawings in which like numerals indicate like elements but, like the illustrative examples, should not be used to limit the present disclosure.

[0014] FIG. 1 is a block diagram of an example of a distributed computing environment 102 for implementing a resource-usage notification framework according to some aspects. The distributed computing environment 102 can include any number of nodes, such as servers or virtual machines. In this example, the distributed computing environment 102 includes nodes 104a-c.

[0015] At least some of the nodes 104a-c include software applications 106a-c and monitoring agents 108a-c. In this example, node 104a includes software application 106a and monitoring agent 108a, node 104b includes software application 106b and monitoring agent 108b, and node 104c includes software application 106c and monitoring agent 108c. The nodes 104a-c can communicate with a notification controller 110 about the respective resource usage of the respective software applications 106a-c and receive event notifications from the notification controller 110.

[0016] As one particular example, software application 106a can run on node 104a. The monitoring agent 108a can determine resource usage 114 for the software application 106a. Examples of the resource usage 114 can include memory usage, network usage, disk usage, central-processing unit usage, or any combination of these. The monitoring agent 108a can transmit the resource usage 114 to the notification controller 110. There can be a single instance or multiple instances of the notification controller 110 within the distributed computing environment 102. The notification controller 110 can be on the node 104a running the software application 106a or on a different node within the distributed computing environment 102. The notification controller 110 can process the resource usage 114 and determine if the resource usage 114 is within a predefined range of a predefined resource-consumption limit. For example, if the predefined resource-consumption limit is 2 GB of RAM, the notification controller 110 can determine whether the RAM usage of software application 106a is within 5% of the 2 GB limit (whether the software application 106a is consuming at least 1.9 GB of RAM). If the notification controller 110 determines that the resource usage 114 is within the predefined range of the predefined resource-consumption limit, the notification controller 110 can generate an event notification 116. The event notification 116 can indicate a high resource-consumption event in which the resource usage of a software application is approaching or has exceeded the

predefined resource-consumption limit. In some examples, the event notification 116 may indicate a particular event type, whereby there may be many different event types associated with one or more resources approaching their limits. The notification controller 110 can then transmit the event notification 116 to the software application 106a of node 104a.

[0017] The software application 106a can receive the event notification 116 and responsively perform a mitigation operation. The mitigation operation can be configured to prevent the resource usage 114 from exceeding the predefined resource-consumption limit or mitigate an impact of the resource usage 114 exceeding the predefined resource-consumption limit.

[0018] In some examples, the software application 106a can determine the mitigation operation by accessing a lookup table 112a that specifies correlations between event notifications and mitigation operations. In this example, the lookup table 112a is within the software application 106a. In another example, the lookup table 112a can be external to the software application 106a and can be accessed by the software application 106a. The lookup table 112a can include predefined relationships between types of event notifications and types of mitigation operations. In one example, the lookup table 112a can correlate one type of event notification to a mitigation operation involving storing intermediate results of a data-processing operation implemented by the software application 106a. In another example, the lookup table 112a can correlate another type of event notification to a mitigation operation involving killing, throttling, or otherwise adjusting one or more processes of the software application 106a to reduce the resource consumption of the software application 106a. In still another example, the lookup table 112a can correlate another type of event notification 116 to a mitigation operation involving migrating the software application 106a from node 104a to another node in the distributed computing environment 102, such as node 104b. The other node may have a higher predefined resource-consumption limit or otherwise have more resources available.

[0019] Although in some examples the software application 106a can determine the mitigation operation, in other examples the notification controller 110 can determine the mitigation operation and transmit the mitigation operation to the software application 106a (e.g., as part of the event notification 116 or in another communication). In some such examples, the notification controller 110 can include or have access to the lookup table 112a for determining the mitigation operation.

[0020] While the above example is described in relation to software application 106a running on one node 104a for simplicity, such monitoring agents can be deployed on any number of nodes in the distributed computing environment 102 to monitor any number of software applications running on any number and combination of nodes. For example, the same process as above could be performed on node 104b running the software application 106b. Monitoring agent 108b can determine the resource usage and communicate the resource usage to the notification controller 110. The notification controller 110 can determine if the resource usage is in the predefined range of the predefined resource-consumption limit. If the resource usage is determined to be within the predefined range of the predefined resource-consumption limit, the notification controller 110 can send an event